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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/760,640

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Stephen R. Van Doren

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EXAMINER

CHERY, MARDOCHEE

ART UNIT

PAPER NUMBER

2188

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
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3 MONTHS

04/18/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/760,640

Applicant(s)

DOREN ET AL.

Examiner

Mardochee Chery

Art Unit

2188

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 January 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-9, 11-13 and 15-24 is/are rejected.
- 7) ☒ Claim(s) 10, 14 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- ☐ Notice of Informal Patent Application
- ☐ Other: _____

DETAILED ACTION

Response to Amendment

1. This Office Action is in response to Applicant's communication filed on January 3, 2007 in response to PTO Office Action mailed on October 10, 2006. The Applicant's remarks and amendments to the claims and/or the specification were considered with the results that follow.
2. In response to the Office Action mailed on October 10, 2006, claims 2, 3, and 11 are amended. Claims 1-24 remain pending.

Response to Arguments

3. Applicant's arguments filed January 3, 2007 have been fully considered but they are not persuasive.
 - a. Applicants argue on page 9 of the remarks that Glasco fails to teach that "a cache state is capable of identifying the first node as being an ordering point for serializing requests from other node for the data".
 1. Examiner strongly disagrees with such contention. Examiner would like to first make it clear that though the prior art must disclose the claimed invention in as complete detail as is contained in the claim, this is not however an ipsissimis verbis test, i.e., identity of terminology is not required. *In re Bond*, 910 F.2d 831, 15 USPQ2d 1566 (Fed. Cir. 1990). Though the prior art

may use terms similar to that of applicants' claimed invention, it also suffices that the prior art discloses the claimed subject matter at least in the manner recited in applicants' specification.

2. As described on page 8, paragraph [0033] of the specification, "the state of a cache line can be utilized to define a cache ordering point in a system. In particular, for a protocol implementing the states set forth in Table 1 (I, S, E, F, D, M, O), a cache line having one of the states M, O, E, F, or D can serve as an ordering point for the data contained in that cache line. In particular, a cache line having any one of the states M, O, and D must implement a write-back to memory upon displacement of the associated data. As a result of implementing the write-back, a cache ordering point for a given cache line will migrate from the cache of an associated processor to memory so that the memory contains a coherent copy of the data".
3. As described on page 12, paragraph [0042] of the specification, "a target node can provide an ownership data response that includes D-DATA, for example, when the processor has an ownership state (e.g., M, O, E, F, or D) associated with the cached data in the SSP protocol. It is the state of the cached data that defines the node (processor) as a cache ordering point for the data. When a processor responds with D-DATA, the ordering point is

transferred to the requesting processor. S-DATA is a shared data response that indicates data is being returned from a cache ordering point, although the ordering point itself is not being transferred to the requester. An S-DATA response also indicates that a copy of the data may be in one or more other caches. An M-DATA response can be provided by memory (e.g., a home node) by returning the present value for the data stored in memory."

4. Glasco unequivocally discloses as detailed on page 3 of the Office action mailed on October 6, 2006, and at least in paragraphs [0087, 0091] and paragraphs [0116, 0120-0123], "a system having a cache coherency directory where cache lines have states including modified (M), owned (O), shared (S), dirty (D), and invalid (I). If the directory entry indicates that the line is in the "dirty" state, the modified memory line to memory must first be written back to memory; the eviction of a cache coherency directory entry corresponding to a "dirty" line in a remote cache requires that the remote cache writes the line back to memory". Thus, it is manifest that Glasco discloses, as claimed by applicants, "a cache state is capable of identifying the first node as being an ordering point for serializing requests from other node for the data" by virtue of his disclosure of a cache line having

either a modified (M), Owned (O), or dirty (D) state and a write-back to memory upon displacement (i.e., line is dirty or evicted) and consequently when the processor responds with a dirty data, the ordering point is transferred to the requesting processor.

b. Applicants argue on page 10, paragraph 3 of the remarks that Glasco does not involve a data response and on page 11, paragraph 1 concludes that "since the process being described is an eviction of clean (as opposed to dirty) memory line, no data response is provided and no data is written back to memory as part of the eviction process".

Examiner strongly disagrees and would like to emphasize that the prior art disclosure must be considered in its entirety, i.e., as a whole when replying to an art rejection. Glasco incontestably discloses "in a cluster system, requests are generated to specific processors to invalidate cache entries and to write cache entries back to memory; if the directory entry indicates that the line is in the dirty state in any of the remote caches, the modified memory line to memory must first be written back to memory before the line is invalidated in each of the remote caches; paragraphs [0116, 0118, 0120]. Contrary to applicants' contention, Glasco's teaching of "sending invalidation messages to each of the remote caches in a cluster system if the directory entry indicates that the line is in the dirty state" in fact provides acknowledgment and data response to a requested node.

c. Applicants argue on page 11, paragraph 2 of the remarks that "none of the description of Fig. 7 (pars. 87-92) of Glasco teaches or even suggests that a cache state that is capable of identifying a node as an ordering point that enables such node to provide an ownership data response, or an ownership data response that transfers an ordering point to another node".

Since similar arguments were addressed above with respect to claims 1 and 2, applicants' attention is directed to the response to the arguments of claims 1 and 2 above.

d. Applicants' arguments on pages 12-13, with respect to claims 11, 15, 19 and 24 are identical to arguments presented on page 9, with respect to claim 1. As such, the paragraphs supra addressing those arguments are herein referenced.

e. Applicants posit on page 14 of the remarks that "the cache 116 that issues the retry 206 does not retry its transaction using forward progress protocol, but instead it is the responding cache 114 that performs the action to enable an intervention response to proceed" and cite column 5, lines 32-51 in support to these allegations.

However, Examiner carefully reviews that portion of the disclosure of Arimilli and finds nowhere such is taught. As explained on page 2 of

applicants' disclosure, a directory based protocol associates tags with each memory line and a broadcast based protocol snoops requests to the system and Glasco clearly discloses "snoop operations in multiprocessor systems and in particular snoop operations initiated by one device which are retried by another device in a multiprocessor system and making forward progress towards an ultimate state on retried operation; col. 1, ll 6-12".

f. In view of the foregoing, it has been shown that the claimed invention is not patentably distinct over the combination of Glasco (2005/0251626) and Arimilli (6,138,218). Additionally, applicants should eschew reading limitations of the specification into the claims and holding the cited art to the ipsissimis verbis test, i.e., identity of terminology is not required. Furthermore, in response to the Office action, applicants are advised to carefully study and review the cited art of record, and amend the claims to further compact prosecution. Hence the rejection of claims 1-9, 11-13, and 15-24 is strictly maintained.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the

Art Unit: 2188

applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1-6, 11-13, 15-21, and 24 are rejected under 35 U.S.C. 102(e) as being anticipated by Glasco (2005/0251626).

As per claim 1, Glasco discloses a system comprising: a first node having an associated cache including data having an associated first cache state, the first cache state being capable of identifying the first node as being an ordering point for serializing requests from other nodes for the data [par. 45, ll 1-3; par. 87, ll 11-16; pars. 120-123].

As per claim 2, Glasco discloses the first cache state enables the first node to provide a data response to a request for the data from a second node for the data without updating a system memory [par. 131].

As per claim 3, Glasco discloses the first cache state enables the first node to provide an ownership data response to a request for the data from a second node, the ownership data response transferring the ordering point from the first node to the second node [pars. 89-90].

As per claim 4, Glasco discloses the first node provides the ownership data response without updating a system memory [par. 131].

As per claim 5, Glasco discloses the first node defines a first processor and the second node defines a second processor [Fig. 2], each of the first processor and the second processor having an associated cache [par. 3], ll 6-9], the associated caches of the first and second processors each comprising a plurality of cache lines [Abstract], each cache line having a respective tag address that identifies associated data and each cache line having state information that indicates a state of the associated data for the respective cache line [par. 59], the first and second processors being capable of communicating with each other and with other nodes of the system through an interconnect [Fig. 2, Switch 210].

As per claim 6, Glasco discloses a first cache controller associated with the first processor and a second cache controller associated with the second processor [Fig. 2, Controller 230], the first cache controller being operative to manage data requests and responses for the associated cache of the first processor [Abstract], the first cache controller effecting state transitions associated with the data in the associated cache of the first processor based on the data requests and responses for the associated cache of the first processor [par. 10], the second cache controller being operative to manage data requests and responses for the associated cache of the second processor [par. 12], the second cache controller effecting state transitions associated with the data in the associated cache of the second processor based on the data requests and responses for the associated cache of the second processor [par. 15].

As per claim 11, the rationale in the rejection of claim 1 is herein incorporated.

As per claim 12, the rationale in the rejection of claim 2 is herein incorporated.

As per claim 13, the rationale in the rejection of claim 3 is herein incorporated.

As per claim 15, the rationale in the rejection of claim 1 is herein incorporated.

As per claim 16, the rationale in the rejection of claim 1 is herein incorporated.

As per claim 17, the rationale in the rejection of claim 2 is herein incorporated.

As per claim 18, the rationale in the rejection of claim 3 is herein incorporated.

As per claim 19, the rationale in the rejection of claims 1 and 3 is herein incorporated.

As per claim 20, the rationale in the rejection of claim 2 is herein incorporated.

As per claim 21, the rationale in the rejection of claim 3 is herein incorporated.

As per claim 24, the rationale in the rejection of claim 1 is herein incorporated.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 7, 8, 9, and 22-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Glasco (2005/0251626) in view of Arimilli (6,138,218).

As per claim 7, Glasco discloses the claimed invention as discussed above.

However, Glasco does not explicitly teach a third node retries the source broadcast request employing a forward progress protocol as required.

Arimilli discloses a third node retries the source broadcast request employing a forward progress protocol [col. 1, ll 6-12] in order to allow other traffic to proceed and alleviate the prospect of a livelock (col. 1, ll 13-14).

Since the technology for implementing a system with a third node retries the source broadcast request employing a forward progress protocol was well known as evidenced by Arimilli, an artisan would have been motivated to implement this feature in the system of Glasco in order to allow other traffic to proceed and alleviate the prospect

Art Unit: 2188

of a livelock. Thus, it would have been obvious to one of ordinary skill in the art, at the time of invention by Applicant, to modify the system of Glasco to include a third node retrying the source broadcast request employing a forward progress protocol since this would have allowed other traffic to proceed and alleviated the prospect of a livelock (col. 1, ll 13-14) as taught by Arimilli.

As per claim 8, Arimilli discloses the forward progress protocol comprises a null-directory protocol [col. 1, ll 6-12].

As per claim 9, Glasco discloses the source broadcast protocol comprises an incomplete protocol [par. 4, ll 9-11].

As per claims 22 and 23, the rationale in the rejection of claim 7 is herein incorporated.

Allowable Subject Matter

8. Claims 10 and 14 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

Art Unit: 2188

9. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

10. The examiner requests, in response to this Office action, support be shown for language added to any original claims on amendment and any new claims. That is, indicate support for newly added claim language by specifically pointing to page(s) and line no(s) in the specification and/or drawing figure(s). This will assist the examiner in prosecuting the application.

11. When responding to this office action, Applicant is advised to clearly point out the patentable novelty which he or she thinks the claims present, in view of the state of the art disclosed by the references cited or the objections made. He or she must also show how the amendments avoid such references or objections See 37 CFR 1.111 (c).

Art Unit: 2188

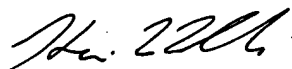
12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mardochee Chery whose telephone number is (571) 272-4246. The examiner can normally be reached on 8:30A-5:00P.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sough Hyung can be reached on (571) 272-6799. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

April 13, 2007

Kevin L. Ellis
Primary Examiner



Mardochee Chery
Examiner
AU 2188